CLAIMS:

What is claimed is:

1. An air handling method comprising the steps of:

- accepting air into a centrifugal fan having a centrifugal fan impeller element;
- rotationally impelling said air through use of said centrifugal fan impeller element;
- imparting a centrifugal force to said air;
- discharging said impelled air into a diffuser element;
- transforming tangential velocity pressure of said discharged, impelled air to static pressure without using vanes and by decreasing tangential velocity of said discharged, impelled air;
- increasing static pressure of said discharged, impelled air as a result of said step of decreasing tangential velocity of said discharged, impelled air;
- outputting said discharged, impelled air to a downflow air handling environment; and
- sufficiently controlling radial velocity of said discharged, impelled air as it travels through said diffuser element so as to avoid a problem related to recirculation back into said diffuser element of said discharged, impelled air output to said downflow air handling environment,

wherein said step of transforming tangential velocity pressure comprises the step of radially extending an interface through which said discharged, impelled air is output to said downflow air handling environment, and

wherein said step of sufficiently controlling radial velocity of discharged, impelled air comprises the step of axially converging said discharged, impelled air.

2. An air handling method as described in claim 1 wherein said step of axially converging said discharged, impelled air comprises the step of smoothly axially converging said discharged, impelled air.

3. An air handling method as described in claim 1 wherein said diffuser element has a diffuser outlet having a diffuser outlet area and a diffuser inlet having a diffuser inlet area, and said diffuser outlet area and said diffuser inlet area are approximately equal.

4. An air handling method as described in claim 1 wherein said step of transforming tangential velocity pressure to static pressure has an efficiency selected from the group of efficiencies consisting of: at least 70%, at least 80%, and at least 85%.

5. An air handling method as described in claim 1 wherein said step of transforming tangential velocity pressure to static pressure comprises the step of transforming tangential velocity pressure to effect at least 90% of the total increase in static pressure observed as said discharged, impelled air travels through said diffuser element.

6. An air handling method as described in claim 1 wherein said step of outputting said discharged, impelled air to a downflow air handling environment comprises the step of outputting said discharged, impelled air to a downflow air handling environment with a zero net velocity.

7. An air handling method as described in claim 1 wherein said step of outputting said discharged, impelled air to a downflow air handling environment comprises the step of outputting said discharged, impelled air to a scroll.

8. An air handling method as described in claim 7 further comprising the step of jetting air that is output from said scroll.

9. An air handling method as described in claim 1 wherein the step of outputting said discharged, impelled air to a downflow air handling environment comprises the step of output said discharged, impelled air to a plenum.

10. An air handling method as described in claim 1 wherein the step of outputting said discharged, impelled air to a downflow air handling environment comprises the step of outputting said discharged, impelled air to a flow turning element that itself outputs to a plenum.

11. An air handling method as described in claim 1 further comprising the step of establishing acoustical material outside of and substantially contiguously with said diffuser element.

12. An air handling method as described in claim 1 wherein said step of increasing static pressure comprises the step of increasing said static pressure less than 30 inches water.

13. An air handling method as described in claim 1 wherein said step of sufficiently controlling radial velocity comprises the step of controlling radial velocity at a diffuser outlet.

14. An air handling method as described in claim 1 wherein said step of sufficiently controlling radial velocity comprises the step of increasing radial velocity only by that amount necessary to avoid said recirculation related problem and by axially converging said discharged, impelled air.

15. An air handling method as described in claim 1 wherein said step of sufficiently controlling radial velocity comprises the step of causing radial velocity to remain substantially the same.

16. An air handling method as described in claim 1 wherein said step of sufficiently controlling radial velocity comprises the step of keeping radial velocity above a critical limit at which said recirculation related problem starts.

17. An air handling method as described in claim 11 further comprising the step of perforating said diffuser element.

18. An air handling method as described in claim 1 wherein said centrifugal fan does not impel air in an axial direction.

19. An air handling method as described in claim 1 wherein said diffuser element is made at least in part from acoustical material.

20. An air handling method as described in claim 1 further comprising the step of axially moving at least one of two oppositely established forms of said diffuser element toward the other of said forms to at least partially obstruct flow of said discharged, impelled air.

21. An air handling method as described in claim 1 wherein said step of imparting a centrifugal force is accomplished through use of forwardly curved impeller blades.

22. An impelled air diffusion apparatus comprising

- a first diffuser form having a first impelled air directing side; and
- a second diffuser form having a second impelled air directing side;

and not comprising vanes,

wherein said first diffuser form and said second diffuser form is each configured for establishment radially outward of a centrifugal fan having a centrifugal fan axis of rotation, so that:

(a) said first impelled air directing side and said second impelled air directing side are substantially opposite and converge as a radial distance from said centrifugal fan axis of rotation increases;

(b) at least a majority of air impelled by said centrifugal fan passes between said first impelled air directing side and said second impelled air directing side; and

(c) impelled air passing between said first impelled air directing side and said second impelled air directing side is output to a downflow air handling environment,

and so as to:

(d) radially extend an interface through which said impelled air passing between said first impelled air directing side and said second impelled air directing side is output to said downflow air handling element;

(e) decrease a first velocity component of said impelled air passing between said first impelled air directing side and said second impelled air directing side,

wherein said first velocity component is substantially parallel to an interface through which the discharged, impelled air is output to said downflow air handling environment;

(f) increase the static pressure of said impelled air passing between the first impelled air directing side and the second impelled air directing side as a result of said decrease of the first velocity component of said impelled air; and

(g) control a second velocity component of said impelled air passing between the first impelled air directing side and the second impelled air directing side so as to avoid problems associated with recirculation of said impelled air output to a downflow air handling environment back into a space between said first impelled air directing side and said second impelled air directing side,

wherein said second velocity component is substantially perpendicular to said interface through which said discharged, impelled air is output to said downflow air handling environment, and

wherein said increase in static pressure is at least 90% the total increase in static pressure observed as said discharged, impelled air travels through said diffuser element.

23. An impelled air diffusion apparatus as described in claim 22 wherein said impelled air passing between said first impelled air directing side and said second impelled air directing side is output from said impelled air diffusion apparatus to a downflow air handling environment with a zero net velocity.

24. An impelled air diffusion apparatus as described in claim 23 wherein said downflow air handling environment comprises a scroll.

25. An impelled air diffusion apparatus as described in claim 24 wherein said scroll comprises a flow jetting, flow output section.

26. An impelled air diffusion apparatus as described in claim 23 wherein said downflow air handling environment comprises a plenum.

27. An impelled air diffusion apparatus as described in claim 26 further comprising a flow turning element to which said impelled air is responsive.

28. An impelled air diffusion apparatus as described in claim 27 wherein said flow turning element comprises an orthogonally turning flow turning element.

29. An impelled air diffusion apparatus as described in claim 22 wherein a diffuser outlet area and a diffuser inlet area defined by said first impelled air directing side and said second impelled air directing side are approximately equal.

30. An impelled air diffusion apparatus as described in claim 22 further comprising acoustical material established outside of and substantially contiguous with said first and said second diffuser forms.

31. An impelled air diffusion apparatus as described in claim 22 wherein said impelled air comprises substantially uncompressed air.

32. An impelled air diffusion apparatus as described in claim 31 wherein said substantially uncompressed air comprises air that is pressurized less than 30 inches of water.

33. An impelled air diffusion apparatus as described in claim 22 wherein said first impelled air directing side and said second impelled air directing side are shaped to effect optimal velocity pressure to static pressure transformation upon establishment substantially opposite one another.

34. An impelled air diffusion apparatus as described in claim 33 wherein said first impelled air directing side and said second impelled air directing side are shaped to keep radial velocity of said impelled air passing between said first and second impelled fluid directing sides substantially just above that amount necessary to avoid problems related to recirculation of impelled air radially outside of said impelled air diffusion apparatus back into a space between said first and second impelled air directing sides.

35. An impelled air diffusion apparatus as described in claim 22 wherein said first and second diffuser forms each configured for establishment radially outward of a centrifugal fan so as to control radial velocity of said impelled air are each configured to increase radial velocity in the vicinity of an outlet of said diffuser element above a critical limit at which said recirculation related problems start.

36. An impelled air diffusion apparatus as described in claim 22 wherein said first and second diffuser forms each configured for establishment radially outward of a centrifugal fan so as to control radial velocity of said impelled air are each configured to keep radial velocity above a critical limit at which recirculation related problems start.

37. An impelled air diffusion apparatus as described in claim 22 further comprising said centrifugal fan.

38. An impelled air diffusion apparatus as described in claim 22 wherein at least one of said first and second diffuser forms is made at least in part from acoustical material.

39. An impelled air diffusion apparatus as described in claim 22 wherein said impelled air diffusion apparatus is non-rotatable.

40. An impelled air diffusion apparatus as described in claim 22 wherein at least one of said first impelled air directing side and said second impelled air directing side is axially movable towards the other said impelled fluid directing side so as to at least partially obstruct flow of said impelled air passing between said first impelled air directing side and said second impelled air directing side.

41. An impelled air diffusion apparatus as described in claim 22 wherein said centrifugal fan comprises forward curved impeller blades.

42. A fluid handling method comprising the steps of:

- accepting fluid into a centrifugal fan having a centrifugal fan axis of rotation and a centrifugal fan impeller element;
- rotationally impelling said fluid through use of a centrifugal fan impeller element;
- imparting a centrifugal force to said fluid;
- discharging said impelled fluid into a diffuser element;

- axially converging said discharged, impelled fluid as a radial distance from said centrifugal axis of rotation increases;
- transforming tangential velocity pressure of said discharged, impelled fluid to static pressure;
- increasing static pressure of said discharged, impelled fluid; and
- outputting said discharged, impelled fluid to a downflow fluid handling environment.

43. A fluid handling method as described in claim 42 wherein said step of transforming tangential velocity pressure of said discharged, impelled fluid to static pressure comprises the step of radially extending an interface through which said discharged, impelled fluid is output to a downflow fluid handling environment.

44. A fluid handling method as described in claim 42 wherein an outlet area of said diffuser element and an inlet area of said diffuser element are approximately equal in size.

45. A fluid handling method as described in claim 42 wherein said step of outputting said discharged, impelled fluid to a downflow fluid handling environment comprises the step of outputting said discharged, impelled fluid to a scroll.

46. A fluid handling method as described in claim 45 further comprising the step of jetting fluid that is output from said scroll.

47. A fluid handling method as described in claim 42 wherein said step of outputting said discharged, impelled fluid to a downflow fluid handling environment comprises the step of outputting said discharged, impelled fluid to a plenum.

48. A fluid handling method as described in claim 42 wherein said step of axially converging comprises the step of smoothly axially converging.

49. A fluid handling method as described in claim 47 wherein said step of outputting said discharged, impelled fluid to a downflow fluid handling environment comprises the step of outputting said discharged, impelled fluid to a flow turning element that outputs to a plenum.

50. A fluid handling method as described in claim 42 wherein said step of transforming tangential velocity pressure to static pressure has an efficiency selected from the group of efficiencies consisting of: greater than 70%, greater than 80%, and greater than 85%.

51. A fluid handling method as described in claim 42 wherein said step of transforming tangential velocity pressure to static pressure comprises the step of transforming tangential velocity pressure to effect at least 90% of the total increase in static pressure observed as said discharged, impelled air travels through said diffuser element.

52. A fluid handling method as described in claim 42 wherein said step of transforming tangential velocity pressure to static prêssure comprises the step of decreasing tangential velocity.

53. A fluid handling method as described in claim 42 further comprising the step of establishing acoustical material outside of and substantially contiguously with said diffuser element.

54. A fluid handling method as described in claim 42 wherein said step of accepting fluid into a centrifugal fan comprises the step of accepting air into a centrifugal fan.

55. A fluid handling method as described in claim 42 wherein rotationally impelling said fluid through use of a centrifugal fan impeller element comprises the step of rotationally impelling said fluid without substantially compressing said fluid.

56. A fluid handling method as described in claim 55 wherein said step of rotationally impelling said fluid without substantially compressing said fluid comprises the step of increasing the static pressure of said fluid by an amount less than 30 inches water.

57. A fluid handling method as described in claim 42 wherein said step of transforming tangential velocity pressure to static pressure comprises the step of optimally transforming tangential velocity pressure.

58. A fluid handling method as described in claim 57 wherein said step of optimally transforming tangential velocity pressure comprises the step of decreasing tangential velocity, and the step of increasing radial velocity in the vicinity of an outlet of said diffuser element only by that amount necessary to just avoid recirculation related problems, wherein said step of increasing radial velocity in the vicinity of an outlet of said diffuser element is accomplished by performing said step of axially converging.

59. A fluid handling method as described in claim 57 wherein said step of optimally transforming tangential velocity pressure comprises the step of decreasing tangential velocity and, by performing said step of axially converging said discharged, impelled fluid, causing said discharged, impelled fluid to exit said diffuser element with a radial velocity that is just greater than that radial velocity at which recirculation related problems start.

60. A fluid handling method as described in claim 42 wherein said step of axially converging said discharged, impelled fluid comprises the step of increasing radial velocity in the vicinity of an outlet of said diffuser element.

61. A fluid handling method as described in claim 60 wherein said step of increasing radial velocity comprises the step of increasing radial velocity only substantially by that amount just necessary to avoid recirculation related problems.

62. A fluid handling method as described in claim 42 wherein said step of axially converging said discharged, impelled fluid comprises the step of keeping radial velocity at exit from said diffuser element above a critical limit at which recirculation related problems start.

63. A fluid handling method as described in claim 42 wherein said step of axially converging said discharged, impelled fluid comprises the step of causing radial velocity to remain substantially the same throughout said diffuser element.

64. A fluid handling method as described in claim 42 wherein said step of transforming velocity pressure of said impelled fluid to static pressure is performed without vanes.

65. A fluid handling method as described in claim 42 wherein said step of axially converging said discharged, impelled fluid comprises the step of continuously axially converge said discharged, impelled fluid along substantially the entire radial length of said diffuser element.

66. A fluid handling method as described in claim 42 wherein said step of outputting said impelled fluid to a downflow fluid handling environment comprises the step of outputting said impelled fluid to a downflow fluid handling environment with a net zero velocity.

67. A fluid handling method as described in claim 53 further comprising the step of perforating said diffuser element.

68. A fluid handling method as described in claim 42 wherein said diffuser element is made at least in part from acoustical material.

69. A fluid handling method as described in claim 42 further comprising the step of axially moving at least one of two oppositely established forms of said diffuser

element toward the other of said forms to at least partially obstruct flow of said discharged, impelled air.

70. A fluid handling method as described in claim 42 wherein said step of imparting a centrifugal force to said fluid is accomplished through the use of forwardly curved impeller blades.

71. An impelled fluid diffusion apparatus comprising:

- a first diffuser form having a first impelled fluid directing side; and
- a second diffuser form having a second impelled fluid directing side;

wherein said first diffuser form and said second diffuser form is each configured for establishment radially outward of a centrifugal fan having a centrifugal fan axis of rotation so that said first impelled fluid directing side is substantially opposite said second impelled fluid directing side and so that at least a majority of fluid impelled by said centrifugal fan passes between said first impelled fluid directing side and said second impelled fluid directing side,

wherein said first impelled fluid directing side and said second impelled fluid directing side define a diffuser inlet and a diffuser outlet, and

wherein said first impelled fluid directing side and said second impelled fluid directing side physically closer at said diffuser outlet than at said diffuser inlet.

72. An impelled fluid diffusion apparatus as described in claim 71 wherein said first impelled fluid directing side and said second impelled fluid directing side axially converge as a radial distance from said centrifugal fan axis of rotation increases and when established substantially opposite one another.

73. An impelled fluid diffusion apparatus as described in claim 72 wherein said first impelled fluid directing side and said second impelled fluid directing side smoothly

axially converge as a radial distance from said centrifugal fan axis of rotation increases and when established substantially opposite one another

74. An impelled fluid diffusion apparatus as described in claim 72 wherein said first and said second impelled fluid directing sides continually axially converge along at least a radial portion of said impelled fluid diffusion apparatus.

75. An impelled fluid diffusion apparatus as described in claim 74 wherein said first and said second impelled fluid directing sides continually axially converge along substantially the entire radial length of said impelled fluid diffusion apparatus.

76. An impelled fluid diffusion apparatus as described in claim 71 wherein said first diffuser form and said second diffuser form is each configured to radially extend an interface through which said impelled fluid is output to a downflow fluid handling environment when established radially outward of a centrifugal fan.

77. An impelled fluid diffusion apparatus as described in claim 76 wherein said downflow fluid handling environment comprises a scroll.

78. An impelled fluid diffusion apparatus as described in claim 77 wherein said scroll comprises a flow jetting, flow output section.

79. An impelled fluid diffusion apparatus as described in claim 76 wherein said downflow fluid handling environment comprises a plenum.

80. An impelled fluid diffusion apparatus as described in claim 79 wherein said downflow fluid handling environment comprises a flow turning element that outputs to plenum.

81. An impelled fluid diffusion apparatus as described in claim 80 wherein said flow turning element comprises an orthogonally turning flow turning element.

82. An impelled fluid diffusion apparatus as described in claim 71 wherein an area of said diffuser outlet and an area of said diffuser inlet are substantially equal in size.

83. An impelled fluid diffusion apparatus as described in claim 71 further comprising acoustical material to reduce noise.

84. An impelled fluid diffusion apparatus as described in claim 83 wherein said acoustical material is established externally of and substantially contiguously with said first and second diffuser forms.

85. An impelled fluid diffusion apparatus as described in claim 71 wherein said impelled fluid comprises impelled air.

86. An impelled fluid diffusion apparatus as described in claim 71 or 85 wherein said impelled fluid comprises substantially uncompressed fluid.

87. An impelled fluid diffusion apparatus as described in claim 86 wherein said substantially uncompressed fluid comprises fluid pressurized less that 30 inches of water.

88. An impelled fluid diffusion apparatus as described in claim 71 wherein first impelled fluid directing side and said second impelled fluid directing side are shaped to transform tangential velocity pressure to static pressure upon establishment substantially opposite one another.

89. An impelled fluid diffusion apparatus as described in claim 88 wherein said tangential velocity pressure to static pressure transformation has an efficiency that is selected from the group of efficiencies consisting of greater than 70%, greater than 80% and greater than 85%.

90. An impelled fluid diffusion apparatus as described in claim 71 wherein said first impelled fluid directing side and said second impelled fluid directing side are shaped to decrease tangential velocity pressure of said fluid impelled by said centrifugal fan and passing between said first impelled fluid directing side and said second impelled fluid directing side and thereby increase the static pressure of said impelled fluid by at least 90% of the total increase in static pressure observed as said impelled fluid passes between said first impelled fluid directing side and said second impelled fluid directing side.

91. An impelled fluid diffusion apparatus as described in claim 71 and not comprising vanes.

92. An impelled fluid diffusion apparatus as described in claim 71 wherein said first diffuser form and said second diffuser form is each configured for establishment radially outward of a centrifugal fan so that said impelled fluid output from said impelled fluid diffusion apparatus has a net zero velocity.

93. An impelled fluid diffusion apparatus further comprising the centrifugal fan of claim 71.

94. An impelled fluid diffusion apparatus as described in claim 71 wherein said centrifugal fan does not impel air in an axial direction.

95. An impelled fluid diffusion apparatus as described in claim 71 wherein at least one of said first diffuser form and said second diffuser form is made at least in part from acoustical material.

96. An impelled fluid diffusion apparatus as described in claim 71 wherein at least one of said first impelled fluid directing side and said second impelled fluid directing side is axially movable towards the other said impelled fluid directing side so as to at least

partially obstruct flow of said impelled air passing between said first impelled fluid directing side and said second impelled fluid directing side.

97. An impelled fluid diffusion apparatus as described in claim 71 wherein said centrifugal fan comprises forward curved impeller blades.

98. An impelled fluid output diffusion method comprising the steps of:

- receiving through a diffuser inlet of a diffuser element a fluid impelled by a centrifugal fan and having a tangential velocity and a radial velocity;
- decreasing said tangential velocity of said impelled fluid;
- increasing static pressure of said impelled fluid as a result of said step of decreasing said tangential velocity;
- controlling radial velocity of said impelled fluid; and
- outputting said impelled fluid through a diffuser outlet of said diffuser element and to a downflow fluid handling environment;

wherein said step of controlling radial velocity of said fluid impelled by a centrifugal fan comprises the step of controlling radial velocity of said impelled fluid so as to avoid problems related to recirculation of said impelled fluid output to said downflow fluid handling environment back into a space defined by said diffuser element.

99. An impelled fluid output diffusion method as described in claim 98 wherein said step of controlling radial velocity of said impelled fluid comprises the step of actively keeping said radial velocity above a critical limit at which said recirculation problems begin.

100. An impelled fluid output diffusion method as described in claim 98 wherein said step of controlling radial velocity of said fluid impelled by said centrifugal fan so as to avoid recirculation related problems of said impelled fluid output to said downflow fluid handling environment comprises the step of controlling radial velocity of said

fluid impelled by said centrifugal fan so as to just avoid recirculation related problems of said impelled fluid output to said downflow fluid handling environment.

101. An impelled fluid output diffusion method as described in claim 98 wherein said step of decreasing said tangential velocity comprises the step of radially extending an interface through which impelled fluid is output to said downflow fluid handling environment.

102. An impelled fluid output diffusion method as described in claim 98 wherein said step of outputting said impelled fluid through a diffuser outlet of said diffuser element and to a downflow fluid handling environment comprises the step of outputting said impelled fluid to a scroll.

103. An impelled fluid output diffusion method as described in claim 102 further comprising the step of jetting fluid output from said scroll.

104. An impelled fluid output diffusion method as described in claim 98 wherein said step of outputting said impelled fluid through a diffuser outlet of said diffuser element and to a downflow fluid handling environment comprises the step of outputting said impelled fluid to a plenum.

105. An impelled fluid output diffusion method as described in claim 104 wherein said step of outputting said impelled fluid through a diffuser outlet of said diffuser element and to a downflow fluid handling environment comprises the step of outputting said impelled fluid to a flow turning element that outputs fluid to said plenum.

106. An impelled fluid output diffusion method as described in claim 98 further comprising the step of establishing acoustical material to reduce noise.

107. An impelled fluid output diffusion method as described in claim 98 wherein said step of establishing acoustical material to reduce noise comprises the step of establishing

acoustical material outside of and substantially contiguously with said diffuser element.

108. An impelled fluid output diffusion method as described in claim 98 wherein said step of receiving through a diffuser inlet of a diffuser element a fluid impelled by a centrifugal fan comprises the step of receiving air.

109. An impelled fluid output diffusion method as described in claim 98 wherein said step of receiving through a diffuser inlet of a diffuser element a fluid impelled by a centrifugal fan comprises the step of receiving a fluid substantially uncompressed by said centrifugal fan.

110. An impelled fluid output diffusion method as described in claim 109 wherein said step of receiving a fluid substantially uncompressed by said centrifugal fan comprises the step of receiving fluid whose static pressure is increase less than 30 inches of water.

111. An impelled fluid output diffusion method as described in claim 98 wherein said step of controlling radial velocity of said impelled fluid comprises the step of controlling radial velocity of said impelled fluid at said outlet of said diffuser element.

112. An impelled fluid output diffusion method as described in claim 98 wherein said step of controlling radial velocity of said impelled fluid comprises the step of increasing radial velocity of said impelled fluid in the vicinity of said diffuser outlet.

113. An impelled fluid output diffusion method as described in claim 98 wherein said step of controlling radial velocity of said impelled fluid comprises the step of causing radial velocity of said impelled fluid to remain substantially unchanged.

114. An impelled fluid output diffusion method as described in claim 98 wherein said step of controlling radial velocity of said impelled fluid comprises the step of causing

radial velocity of said impelled fluid at said diffuser outlet to be above a critical limit at which recirculation related problems start.

115. An impelled fluid output diffusion method as described in claim 98 wherein said step of decreasing said tangential velocity of said fluid impelled by a centrifugal fan and said step of controlling radial velocity of said fluid impelled by a centrifugal fan are each performed without vanes.

116. An impelled fluid output diffusion method as described in claim 98 wherein said step of controlling radial velocity of said impelled fluid is accomplished by axially converging said impelled fluid.

117. An impelled fluid output diffusion method as described in claim 116 wherein said step of controlling radial velocity of said impelled fluid is accomplished by smoothly axially converging said impelled fluid.

118. An impelled fluid output diffusion method as described in claim 116 wherein an area of said diffuser inlet and an area of said diffuser outlet are substantially equal in size.

119. An impelled fluid output diffusion method as described in claim 98 wherein said step of outputting said fluid impelled by a centrifugal fan through a diffuser outlet and to a downflow fluid handling environment comprises the step of outputting said fluid impelled by a centrifugal fan through a diffuser outlet with a net zero velocity.

120. An impelled fluid output diffusion method as described in claim 98 wherein an area of said diffuser inlet and an area of said diffuser outlet are substantially equal in size.

121. An impelled fluid output diffusion method as described in claim 106 further comprising the step of perforating said diffuser element.

122. An impelled fluid output diffusion method as described in claim 98 wherein said centrifugal fan does not impel air in an axial direction.

123. An impelled fluid output diffusion method as described in claim 106 wherein said step of establishing acoustical material to reduce noise comprises the step of establishing acoustical material as at least part of said diffuser element.

124. An impelled fluid output diffusion method as described in claim 98 wherein said step of decreasing said tangential velocity of said impelled fluid and increasing static pressure of said impelled fluid are related by a transformation efficiency selected from the group of efficiencies consisting of: at least 70%, at least 80%, and at least 85%.

125. An impelled fluid output diffusion method as described in claim 98 wherein said step of increasing static pressure of said impelled fluid comprises the step of effecting an increase of at least 90% of the total increase in static pressure observed as said impelled fluid travels through said diffuser element.

126. An impelled fluid output diffusion method as described in claim 98 further comprising the step of axially moving at least one of two oppositely established forms of said diffuser element toward the other of said forms to at least partially obstruct flow of said impelled air.

127. An impelled fluid output diffusion method as described in claim 98 wherein said centrifugal fan has forwardly curved impeller blades.

128. An impelled fluid diffusion apparatus comprising:

- a first diffuser form having a first impelled fluid directing side; and
- a second diffuser form having a second impelled fluid directing side;

wherein said first impelled fluid directing side and said second impelled fluid directing side define an impelled fluid directing profile when said first impelled fluid diffuser

form and said second diffuser form are established substantially opposite one another and radially outward of a centrifugal fan having a centrifugal fan impeller element,

wherein said first impelled fluid directing side and said second impelled fluid directing side define a diffuser inlet and a diffuser outlet;

wherein said impelled fluid directing profile effects a decrease in the tangential velocity of, and a resultant increase in the static pressure of a fluid impelled and discharged by said centrifugal fan impeller element when said first impelled fluid diffuser form and said second diffuser form are established radially outward of a centrifugal fan and substantially opposite one another, and

wherein said impelled fluid directing profile controls the radial velocity of said fluid impelled and discharged by said centrifugal fan impeller element so as to avoid problems related to recirculation of a pressurized fluid output from said radially outward established diffuser forms back into a space between said first and second impelled fluid directing sides.

129. An impelled fluid diffusion apparatus as described in claim 128 wherein said resultant increase in static pressure is at least 90% the total increase in static pressure observed ~~in said fluid impelled and discharged by said CF and as it travels through said~~ impelled fluid diffusion apparatus.

130. An impelled fluid diffusion apparatus as described in claim 128 wherein said impelled fluid directing profile controls the radial velocity of said fluid impelled by said centrifugal fan and discharged by said centrifugal fan so as to just avoid problems related to recirculation of a pressurized fluid output.

131. An impelled fluid diffusion apparatus as described in claim 130 wherein said impelled fluid directing profile controls the radial velocity of said fluid impelled by said centrifugal fan and discharged by said centrifugal fan by causing a radial velocity of

said fluid at said diffuser outlet to be above a critical limit at which said problems related to fluid recirculation begin.

132. An impelled fluid diffusion apparatus as described in claim 128 wherein said first diffuser form and said second diffuser form is each configured to radially extend an interface through which an impelled fluid is output to a downflow fluid handling environment.

133. An impelled fluid diffusion apparatus as described in claim 132 wherein said downflow fluid handling environment comprises a scroll.

134. An impelled fluid diffusion apparatus as described in claim 133 wherein said scroll comprises a flow jetting, flow output section.

135. An impelled fluid diffusion apparatus as described in claim 132 wherein said downflow fluid handling environment comprises a plenum.

136. An impelled fluid diffusion apparatus as described in claim 128 wherein said downflow fluid handling environment comprises a flow turning element that outputs said impelled fluid to a plenum.

137. An impelled fluid diffusion apparatus as described in claim 128 further comprising acoustical material established to reduce noise.

138. An impelled fluid diffusion apparatus as described in claim 128 wherein said acoustical material is established outside of and substantially contiguously with said first and second diffuser forms.

139. An impelled fluid diffusion apparatus as described in claim 128 wherein said impelled fluid comprises air.

140. An impelled fluid diffusion apparatus as described in claim 128 wherein said impelled fluid comprises fluid substantially uncompressed by said centrifugal fan.

141. An impelled fluid diffusion apparatus as described in claim 140 wherein said substantially uncompressed fluid comprises fluid pressurized by an amount that is less than 30 inches water.

142. An impelled fluid diffusion apparatus as described in claim 128 and not comprising vanes

143. An impelled fluid diffusion apparatus as described in claim 128 wherein said impelled fluid directing profile increases the radial velocity of said fluid impelled by said centrifugal fan in the vicinity of said diffuser outlet.

144. An impelled fluid diffusion apparatus as described in claim 128 wherein said impelled fluid directing profile causes the radial velocity of said fluid impelled by said centrifugal fan to remain substantially unchanged.

145. An impelled fluid diffusion apparatus as described in claim 128 wherein said impelled fluid directing profile causes the radial velocity of said fluid impelled by said centrifugal fan to be above a critical limit at which said recirculation related problems begin.

146. An impelled fluid diffusion apparatus as described in claim 128 wherein said impelled fluid directing profile converges axially.

147. An impelled fluid diffusion apparatus as described in claim 146 wherein an area of said diffuser inlet and an area of said diffuser outlet are substantially equal in size.

148. An impelled fluid diffusion apparatus as described in claim 128 wherein said first diffuser form and said second diffuser form are established so as to output said impelled fluid to a downflow fluid handling environment with net zero velocity

149. An impelled fluid diffusion apparatus further comprising the centrifugal fan of claim 128.

150. An impelled fluid diffusion apparatus as described in claim 128 wherein at least one of said first diffuser form and said second diffuser form is made at least in part from acoustical material.

151. An impelled fluid diffusion apparatus as described in claim 128 wherein said first and second diffuser forms are non-rotatable.

152. An impelled fluid diffusion apparatus as described in claim 128 wherein at least one of said first impelled fluid directing side and said second impelled fluid directing side is axially movable towards the other impelled fluid directing side so as to at least partially obstruct flow of said impelled air passing between said first impelled fluid directing side and said second impelled fluid directing side.

153. An impelled fluid diffusion apparatus as described in claim 128 wherein said centrifugal fan comprises forward curved impeller blades.

154. An air handling method comprising the steps of:

- accepting air into a centrifugal fan having a centrifugal fan impeller element;
- rotationally impelling said air through use of said centrifugal fan impeller element;
- imparting a centrifugal force to said air;
- discharging said impelled air into a diffuser element;
- transforming tangential velocity pressure of said discharged, impelled air to static pressure without using vanes and by decreasing tangential velocity;

- increasing static pressure of said discharged, impelled air;
- sufficiently controlling radial velocity of said impelled air so as to avoid problems related to recirculation of said discharged, impelled air output to said downflow air handling environment;
- outputting said discharged, impelled air to a plenum; and
- establishing acoustical material substantially outside of and contiguously with said diffuser element,

wherein said step of transforming tangential velocity pressure of said discharged, impelled air comprises the step of radially extending an interface through which said discharged, impelled air is output to said plenum, and

wherein said step of sufficiently controlling radial velocity of discharged, impelled air comprises the step of axially converging said discharged, impelled air, and

wherein said recirculation is recirculation of said discharged impelled air output to a plenum back into as space defined by said diffuser element

155. An air handling method as described in claim 154 wherein said output impelled air has a net zero velocity.

156. An air handling method as described in claim 154 wherein said step of axially converging said discharged, impelled air comprises the step of smoothly axially converging said discharged, impelled air.

157. An air handling method as described in claim 154 wherein said step of increasing static pressure of said discharged, impelled air comprises the step of increasing by at least 90% of the total increase in static pressure observed as said discharged, impelled air passes through said diffuser element.

158. An air handling method further comprising the centrifugal fan of claim 154.

159. An air handling method as described in claim 154 wherein said centrifugal fan does not impel air in an axial direction.

160. An air handling method as described in claim 154 wherein said diffuser element is non-rotatable.

161. An air handling method as described in claim 154 further comprising the step of axially moving at least one of two oppositely established forms of said diffuser element toward the other of said forms to at least partially obstruct flow of said discharged, impelled air.

162. An air handling method as described in claim 154 wherein said step of transforming tangential velocity pressure to static pressure has an efficiency selected from the group of efficiencies consisting of: at least 70%, at least 80%, and at least 85%.

163. An air handling method as described in claim 154 wherein said step of transforming tangential velocity pressure of said discharged, impelled air to static pressure effects an increase of at least 90% of the total increase in static pressure observed as said impelled fluid travels through said diffuser element.

164. An air handling method as described in claim 154 wherein an area of an outlet of said diffuser element is substantially equal to an area of an inlet of said diffuser element.

165. An air handling method as described in claim 154 wherein said step of imparting a centrifugal force is accomplished though use of forwardly curved impeller blades.

166. An impelled air diffusion apparatus comprising

- a first diffuser form having a first impelled air directing side; and
- a second diffuser form having a second impelled air directing side;

- acoustical material established outside of and substantially contiguously with said first impelled air directing side and said second impelled air directing side,

and not comprising vanes,

wherein said first diffuser form and said second diffuser form is each configured for establishment radially outward of a centrifugal fan having a centrifugal fan impeller element so that:

(a) said first impelled air directing side is substantially opposite and axially converges toward said second impelled air directing side along at least a radial portion of said impelled air diffusion apparatus;

(b) at least a majority of air impelled by said centrifugal fan passes between said first impelled air directing side and said second impelled air directing side; and

(c) impelled air passing between said first impelled air directing side and said second impelled air directing side is output to a plenum,

wherein said first diffuser form and said second diffuser form is each configured to radially extend an interface through which air impelled by said centrifugal fan impeller element is output to said plenum so as to decrease the tangential velocity of said impelled air passing between said first impelled air directing side and said second impelled air directing side, thereby increasing the static pressure of said impelled air passing between said first impelled air directing side and said second impelled air directing side

167. An impelled air diffusion apparatus as described in claim 166 wherein said output to a plenum has a zero net velocity.

168. An impelled air diffusion apparatus as described in claim 166 wherein said increase in static pressure of said impelled air comprises an increase by at least 90% of the total increase in static pressure observed as said impelled air passing between said first impelled air directing side and said second impelled air directing side.

169. An impelled air diffusion apparatus further comprising the centrifugal fan of claim 166.

170. An impelled air diffusion apparatus as described in claim 166 wherein said first impelled air directing side is substantially opposite and smoothly axially converges toward said second impelled air directing side.

171. An impelled air diffusion apparatus as described in claim 166 wherein diffuser is non-rotatable.

172. An impelled air diffusion apparatus as described in claim 166 wherein said centrifugal fan does not impel air in an axial direction.

173. An impelled air diffusion apparatus as described in claim 166 wherein an area of an outlet established by said first impelled air directing side and said second impelled air directing side is substantially equal to an area of an inlet established by said first impelled air directing side and said second impelled air directing side.

174. An impelled air diffusion apparatus as described in claim 166 wherein at least one of said first impelled fluid directing side and said second impelled fluid directing side is axially movable towards the other impelled fluid directing side so as to at least partially obstruct flow of said impelled air passing between said first impelled fluid directing side and said second impelled fluid directing side.

175. An impelled air diffusion apparatus as described in claim 166 wherein said centrifugal fan has forwardly curved impeller blades.

176. A fluid handling method comprising the steps of:

- accepting fluid into a centrifugal fan having a centrifugal fan axis of rotation and a centrifugal fan impeller element;
- rotationally impelling said fluid through use of a centrifugal fan impeller element;
- imparting a centrifugal force to said fluid;
- discharging said impelled fluid into a diffuser element;
- transforming tangential velocity pressure of said discharged, impelled fluid to static pressure with a regain efficiency of at least 70 %;
- increasing static pressure of said discharged, impelled fluid as a result of said step of transforming tangential velocity pressure of said discharged, impelled fluid to static pressure; and
- outputting said discharged, impelled fluid to a downflow fluid handling environment,

wherein said step of transforming tangential velocity pressure to static pressure comprises the step of transforming tangential velocity pressure to effect at least 90% of the total increase in static pressure observed as said discharged, impelled air travels through said diffuser element.

177. A fluid handling method as described in claim 176 further comprising the step of axially converging said discharged, impelled fluid as a radial distance from said centrifugal axis of rotation increases.

178. A fluid handling method as described in claim 176 wherein said step of imparting a centrifugal force to said fluid is accomplished through use of forwardly curved impeller blades.

179. An impelled air diffusion apparatus comprising

- a first diffuser form having a first impelled air directing side; and

- a second diffuser form having a second impelled air directing side;

and not comprising vanes,

wherein said first diffuser form and said second diffuser form is each configured for establishment radially outward of a centrifugal fan having a centrifugal fan axis of rotation, so that:

(a) at least a majority of air impelled by said centrifugal fan passes between said first impelled air directing side and said second impelled air directing side; and

(b) impelled air passing between said first impelled air directing side and said second impelled air directing side is output to a downflow air handling environment,

and so as to:

(c) decrease a first velocity component of said impelled air passing between the first impelled air directing side and the second impelled air directing side, wherein said first velocity component is substantially parallel to an interface through which said discharged, impelled air is output to said downflow air handling environment,

(d) increase the static pressure of said impelled air passing between the first impelled air directing side and the second impelled air directing side as a result of said decrease of said first velocity component of said impelled air; and

(e) control a second velocity component of said impelled air passing between the first impelled air directing side and the second impelled air directing side so as to avoid problems associated with recirculation of said impelled air output to said downflow air handling environment

back into a space between said first impelled air directing side and said second impelled air directing side,

wherein said second velocity component is substantially perpendicular to said interface through which said discharged, impelled air is output to said downflow air handling environment, and

wherein said increase in static pressure is at least 90% the total increase in static pressure observed as said discharged, impelled air travels through said diffuser element.

180. An impelled air diffusion apparatus as described in claim 179 wherein said centrifugal fan comprises forwardly curved impeller blades.

181. An impelled air diffusion apparatus as described in claim 179 wherein said control of a second velocity component of said impelled air is accomplished by a first impelled air directing side that converges towards the second impelled air directing side.